

RHYNCHOSPORA LEPTOCARPA (CYPERACEAE),
AN OVERLOOKED SPECIES OF THE
SOUTHEASTERN UNITED STATES

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ABSTRACT

Based on morphological analysis, *Rhynchospora leptocarpa*, long synonymized under *R. capitellata*, is reinstated as a distinct species. Although clearly related to the latter, *R. leptocarpa* differs in a number of mensural and qualitative characters. Furthermore, its distribution is confined to the southern coastal plain and it inhabits a narrow range of plant communities, very unlike those of *R. capitellata*. Based on the relative ease of finding *R. leptocarpa* in suitable habitat, it is believed not to be rare, but merely overlooked.

RESUMEN

En base a análisis morfológicos *Rhynchospora leptocarpa*, que fue sinonimizada a *R. capitellata*, se vuelve a considerar como una especie diferente. Aunque claramente relacionada con esta última, *R. leptocarpa* difiere en cierto número de caracteres cuantitativos y cualitativos. Además, su distribución está confinada al sur de la llanura costera y vive en un número restringido de comunidades vegetales, muy diferentes de las de *R. capitellata*. Debido a lo fácil que es encontrar *R. leptocarpa* en los hábitats adecuados, se cree que no es rara, sino que simplemente ha sido ignorada.

INTRODUCTION

Rhynchospora leptocarpa (Chapm. ex Britt.) Small was first recognized as a distinct entity by A.W. Chapman, longtime resident of the Florida panhandle and author of *Flora of the Southern United States* (Chapman 1860, 1883, 1897). Curiously, Chapman did not publish the name, although he had prepared a manuscript (fide Britton 1892). In the three editions of his *Flora*, Chapman does not mention this entity. In 1892 Britton published it as *R. glomerata* (L.) Vahl var. *leptocarpa* Chapm. and ascribed to it a range of South Carolina, Florida, and Alabama. Later, Blake (1918) unraveled the *R. glomerata* tangle by splitting off the generally more northern *R. capitellata* (Michx.) Vahl from the more southern *R. glomerata*. Blake treated the entity as *R. capitellata* var. *leptocarpa* (Chapm. ex Britt.) Blake and provided a brief Latin diagnosis. Blake gave its range as Virginia to Florida and Mississippi. In the second edition of his *Flora*, Small (1933) raised it to full species status (without explanation or discussion) and provided the only complete English description available. Small gave its range as South Carolina to Florida and Mississippi. In her monograph of the section *Eurhynchospora*, Gale (1944) reduced it not to varietal status, but to complete synonymy under *R. capitellata*. Although she treated two other botanical forms of *R. capitellata*, Gale omitted any discussion of taxon *leptocarpa*, possibly due to the paucity of known specimens at that time.

Subsequent authors, most notably Clewell (1985), Godfrey and Wooten (1979), Jones and Coile (1988), Kartesz (1994), Radford et al. (1968), and Wunderlin (1998), do not recognize *R. leptocarpa* at any level. None of the state Natural Heritage Programs within the range of *R. leptocarpa* recognizes it or lists it as rare, except for North Carolina. The only references to *Rhynchospora leptocarpa* in the past half century are those of Anderson (1995) and Sorrie et al. (1997). Anderson collected specimens in the Florida panhandle and treated *leptocarpa* at the species level, but suggested that the *R. capitellata* complex needed further study. Robert Kral (pers. comm.) also has suggested that *R. leptocarpa* may warrant renewed status.

My attention was first brought to the problem by Julia Larke, who collected plants in 1992 on Fort Bragg Military Reservation, North Carolina, as part of a rare species survey. Although these plants keyed cleanly in Godfrey and Wooten (1979) and Gale (1944), her plants did not closely resemble plants I knew from New England as *R. capitellata*. Field and herbarium studies over the past seven years have convinced me that the two are distinct species.

MATERIALS AND METHODS

Specimens of *Rhynchospora leptocarpa* were collected in the field during the course of botanical survey work in Alabama, Florida, Mississippi, and North Carolina. These have been supplemented by specimens examined at the following herbaria: DUKE, FLAS, FSU, GA, GH, IBE, NCSC, NCU, SWSL, US, USA, VDB. From across the range of each species, five achenes from each of 10 plants were measured. Measurements were made of the following achene characters: length of achene body, tubercle length, and length of perianth bristles relative to tubercle (e.g., the length that the bristles exceed the tip of the tubercle). Measurements were also made of the width of spikelet clusters ($n = 50$). Counts were made of the number of spikelet clusters per culm and the number of glomerules per inflorescence node ($n = 50$).

Notes on habitat were made at over 40 sites in the field, supplemented by herbarium label data. Range maps were prepared from available literature, atlases, herbarium specimens, and field work.

Herbarium acronyms follow Holmgren et al. (1990), except "bas" (personal herbarium of Bruce A. Sorrie).

RESULTS AND DISCUSSION

Distinguishing characters

Mensural data are presented in Table 1. These data suggest that *Rhynchospora leptocarpa* differs from *R. capitellata* in at least four important ways.

1) *Number of spikelet clusters per culm.*—*Rhynchospora leptocarpa* possesses 5–8 clusters per culm, occasionally 4; *R. capitellata* possesses 3–5, rarely 6.

2) *Glomerule width.*—Each spikelet cluster is composed of 1–3 head-like glomerules, which are much broader in *R. capitellata*. In addition, glomerules of *R. leptocarpa*

TABLE 1. Comparison of selected characters of *Rhynchospora leptocarpa* and *R. capitellata*, based on 50 counts or measurements. Measurements in millimeters.

Character	<i>R. leptocarpa</i>	<i>R. capitellata</i>
number of spikelet clusters per culm	4–8 (\bar{x} =6.2)	3–5 (\bar{x} =4.1)
glomerule width	4–8 (\bar{x} =6.8)	6–13 (\bar{x} =9.1)
achene body length	1.6–1.8 (\bar{x} =1.7)	1.4–1.8 (\bar{x} =1.6)
tubercle length	0.8–1.1 (\bar{x} =1.0)	0.9–1.4 (–1.6) (\bar{x} =1.1)
ratio of achene body/tubercle length	1.75	1.45
longest bristle relative to tip of tubercle	bristle exceeds tip by 0.3–1.0 mm (\bar{x} =0.8 mm longer)	bristle varies from shorter than tip (0.4 mm) to longer (0.3 mm) (\bar{x} =0.05 mm shorter)

assume a turbinate shape, rather than the broadly ovoid to hemispherical shape of *R. capitellata*.

3) *Achene body and tubercle length*.—Although the combined length of body and tubercle is similar in the two species, the proportions differ. Body length of *R. leptocarpa* averages longer than *capitellata*, but tubercle length averages shorter.

4) *Bristle length*.—A striking feature of *R. leptocarpa* is that the bristles always exceed the tubercle (in rare instances, one of the six bristles may be equal or slightly shorter). Moreover, the longest bristle usually exceeds the tubercle by at least 0.5 mm. In *R. capitellata*, bristles normally are slightly shorter than the tubercle, but the longest bristle may exceed it by 0.2 or even 0.3 mm.

There are qualitative characters which also serve to distinguish the two species. The first three are strikingly different and will facilitate field identification.

1)—Plants of *R. leptocarpa* form dense tussocks, from which radiate many lazy culms (prostrate to ascending). This habit of the culms appears to be a constant feature, independent of flooding or fire events (pers. obs.). By contrast, *R. capitellata*, although more-or-less cespitose, does not form dense tussocks and the relatively few culms are erect to strongly ascending. Anderson (1995) reports 30–40 culms for *R. leptocarpa* in Florida, and I have occasionally noted similar numbers in North Carolina, but my sense is that 15–30 is the norm. Herbarium specimens almost invariably consist of a lesser number of culms, because whole plants are rarely collected.

2)—Foliage and culms of *R. leptocarpa* are light green, often glaucescent; those of *R. capitellata* are medium to dark green. These differences are retained in dried specimens and seem to be independent of light levels. For example, *R. leptocarpa* growing in clearings created by logging or military activity show the same pale coloration as those growing in shade. Similarly, *R. capitellata* retains the same dark coloration in dense alder thickets as when growing in open sites (pers. obs.).

3)—Spikelet clusters of *R. leptocarpa* are pale brown; those of *R. capitellata* are dark brown.

4)—Number of glomerules per spikelet cluster. In *R. leptocarpa*, glomerules occur singly or in pairs at intervals along the culm; in *R. capitellata*, glomerules are paired or tripled—there clearly are 2–3 “heads”, arising from separate or branched stalks. Combined with greater glomerule width, the overall effect is to give *R. capitellata* a very much broader look to the clusters.

5)—Mature achene color is pale brown with a pale central bulge (umbo) in *R. leptocarpa*; dark brown with a more contrasting pale bulge in *R. capitellata*.

6)—The base of the achene narrows into a shorter stipe in *R. leptocarpa* than in *R. capitellata*, as depicted by Blake (1918).

Habitat

The widespread *Rhynchospora capitellata* occupies a broad range of moist to wet, mostly open habitats, from moist meadows to wet marshes, creek banks, pond and lake shores, beaver ponds, peat bogs, and roadside ditches. By contrast, *R. leptocarpa* is very limited in its habitat preference, occurring almost exclusively in sphagnous streamhead communities within longleaf pine ecosystems. These communities receive water from seepage which discharges from adjacent uplands and form the head ends and upper portions of drainage creeks. In the Carolinas, they are termed “streamhead pocosins,” due to the density of shrubs in them. Farther south and on the Gulf Coastal Plain, they are called “baygalls,” due to the presence of “bay” species: sweet bay, *Magnolia virginiana* L.; red bay, *Persea palustris* (Raf.) Sarg.; loblolly bay, *Gordonia lasianthus* (L.) Ellis. When embedded in a mesic ravine, as occurs frequently on the Gulf Coastal Plain, the baygall community is called a “steephead.” All of these habitats are typically forested, but the narrowness of such streamheads normally allows for filtered sunlight to penetrate from the sides. There, *R. leptocarpa* occurs in the semi-shade of trees and tall shrubs, and especially in small openings created by blowdowns, fire, animal trails, and human disturbance. Downstream, where flooding becomes too frequent or of long duration, *R. leptocarpa* is absent. Table 2 lists common associates at streamhead sites.

In addition, *Rhynchospora leptocarpa* occasionally inhabits sphagnous margins of beaver ponds and human impoundments, especially where tributaries enter. One specimen from southern Mobile County, Alabama, was collected from a “pitcher plant bog,” presumably from the edge where such bogs typically grade into streamheads. Anderson (1995) reports *R. leptocarpa* from the upper edge of a tidal marsh in panhandle Florida; it is the only record from a near-maritime habitat.

Range

Rhynchospora capitellata is a wide-ranging species of the northeastern United States and southeastern Canada. Figure 1 portrays this range, with emphasis on the southern margins. *Rhynchospora capitellata* is common southward through the montane and plateau regions of the Carolinas, north Georgia, Tennessee, northeastern Alabama, southern

TABLE 2. Common associates of *Rhynchospora leptocarpa* in streamhead habitats. Species are listed alphabetically within each group, not according to frequency.

TREES

Acer rubrum L.
Chamaecyparis thyoides (L.) B.S.P.
Ilex opaca Aiton
Liriodendron tulipifera L.
Magnolia virginiana L.
Nyssa biflora Walter
Persea palustris (Raf.) Sarg.
Pinus elliotii Engelm. var. *elliotii*
Pinus serotina Michx.

SHRUBS AND VINES

Clethra alnifolia L.
Cliftonia monophylla (Lam.) Britton ex Sarg.
Cyrilla racemiflora L.
Ilex coriacea (Pursh) Chapman
Illicium floridanum Ellis
Leucothoe racemosa (L.) Gray
Lyonia lucida (Lam.) K. Koch
Myrica heterophylla Raf.
Rhododendron viscosum (L.) Torrey
Smilax laurifolia L.
Toxicodendron vernix (L.) Kuntze
Vaccinium formosum H.C. Andrews
Viburnum nudum L.

HERBS

Arundinaria tecta (Walter) Muhl.
Carex collinsii Nutt.
Eriocaulon decangulare L.
Mayaca fluviatilis Aubl.
Osmunda cinnamomea L.
Panicum lucidum Ashe
Peltandra sagittifolia (Michx.) Morong
Pinguicula primuliflora Wood & Godfrey
Platanthera clavellata (Michx.) Luer
Rhynchospora chalarocephala Fern. & Gale
Rhynchospora gracilentata Gray
Rhynchospora stenophylla Chapman
Sphagnum sp.
Viola primulifolia L.
Woodwardia areolata (L.) T. Moore

Missouri, and Arkansas. However, it abruptly becomes rare southward and is absent from the rest of the southern Atlantic and East Gulf Coastal Plains.

In southern Arkansas, *R. capitellata* appears to be fairly common (Smith 1988), but I question whether all specimens are correctly identified, since three specimens have recently been annotated to *R. glomerata*: Bradley Co., *Demaree 24539* (NCU); Hempstead Co., *Demaree 54102* (NCU); Pulaski Co., *Merrill 183* (GH).

In Louisiana, Thomas and Allen (1993) map *R. capitellata* in five parishes, but two cited specimens are actually *R. glomerata*: Natchitoches Parish, *Thomas 72521* (NLU); Rapides Parish, *Thomas 40834* (NLU). In addition, specimens from Grant, Morehouse, Ouachita, Rapides, Sabine, and Vernon parishes (FSU, NCU, NLU) prove not to be *R. capitellata*. A Union Parish specimen is equivocal—the achene size is closer to *R. glomerata*, but shape is closer to *R. capitellata*: *Lewis 3308* (NLU). I have not seen specimens from Red River and Winn parishes that were cited by Thomas and Allen.

Two east Texas specimens are correctly identified as *Rhynchospora capitellata*: Henderson Co., *Correll 26688* (GH); Smith Co., *Moore, Jr. 888* (GH). Both were collected in hillside seepage bogs. A Leon County collection, also from a bog, proves to be *R. glomerata* var. *angusta* Gale, an overlooked taxon of the West Gulf Coastal Plain: *Barkley 13505* (GH, US).

Rhynchospora leptocarpa is a strict inhabitant of the southern Atlantic and East Gulf Coastal Plains (Fig. 1). It occurs from the vicinity of New Orleans, Louisiana, eastward to Tallahassee, Florida and adjacent Georgia, then reappears in the Sandhills region of the

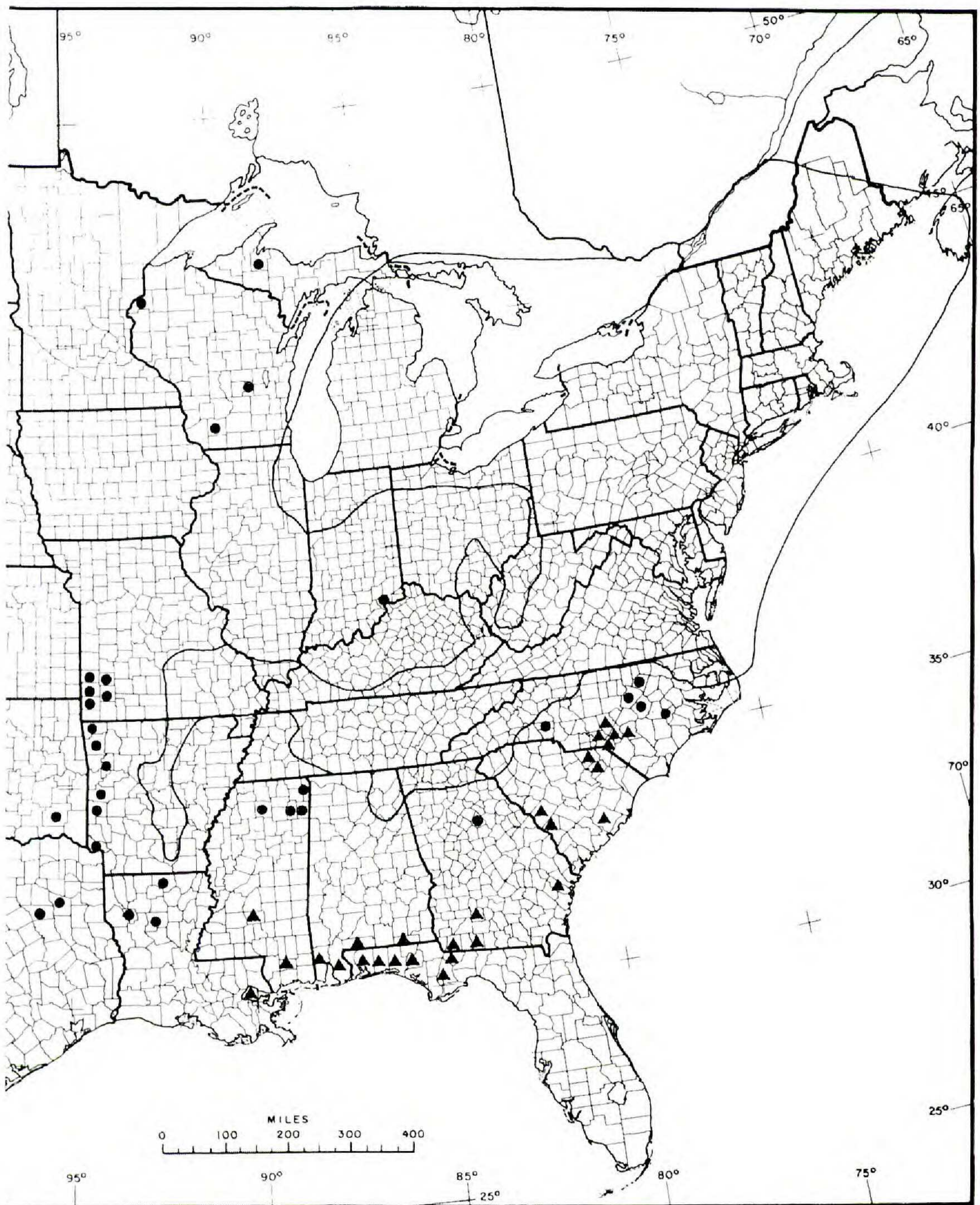


FIG. 1: Ranges of *Rhynchospora leptocarpa* and *R. capitellata* in the eastern United States and Canada. Triangles = *R. leptocarpa*. Dots = extralimital records of *R. capitellata*. Area bounded by solid line = general distribution of *R. capitellata*.

Carolinas. Current knowledge suggests that *R. leptocarpa* rarely occurs on the outer portion of the Atlantic Coastal Plain. This distribution pattern—a Gulf Coastal Plain component and a disjunct Carolina Sandhills component—occurs in a number of other species (Sorrie et al. 1997). Among the latter is *Rhynchospora macra* (C.B. Clarke) Small, which inhabits open seepage slopes adjacent to streamheads and baygalls.

Rhynchospora leptocarpa and *R. capitellata* are not currently known to be sympatric, but further field work may bridge the narrow gap that separates them. Speciation may have occurred during the Pleistocene, when glaciation cycles forced the ancestral entity (presumably a species of cool temperate climates) deep onto the coastal plain. Once there, this entity survived in open wet habitats analogous to those farther north, and also by adapting to localized cool-water environments in shady streamheads. Retreat of glaciers allowed the ancestral entity to return northward, while the newly adapted entity of southern streamheads remained. Several glacial cycles may have been involved to complete speciation. Alternatively, the ancestral entity may have occupied a southern range; during glacial cycles peripheral populations became adapted to a broad suite of cool-water habitats as they migrated northward.

Representative specimens. The following are representative specimens from throughout the range of *Rhynchospora leptocarpa* and include all historical collections. **ALABAMA: Baldwin Co.:** frequent in wet wooded stream with *Peltandra sagittifolia*, upper Majors Creek drainage, 26 Jun 1993, L.C. Anderson 14393 (FSU). **Geneva Co.:** W of route 87, 6.7 mi. S of Samson, sphagnous headwaters of tributary of Pea River, 3 Aug 1996, B.A. Sorrie 8960 (bas, NCU). **Mobile Co.:** pine woods near the coast, Jul 1879, C. Mohr s.n. (US); Theodore, pitcher plant bog on Range Line Road, 22 Nov 1980, M. Powers s.n. (USA). **FLORIDA: Gadsden Co.:** Quincy, A.W. Chapman s.n. (GH). **Liberty Co.:** hammock on road 12 near Bristol, 22 Jul 1940, West and Arnold s.n. (FLAS). **Santa Rosa Co.:** 5 mi. N of Milton, local in dense sweet bay-*Cliftonia* hammock, 24 Jul 1965, S. McDaniel 6607 (IBE); Eglin Air Force Base, bay swamp near head of steephead ravine, Weaver Creek, 22 Sep 1989, Orzell and Bridges 12567 (NCU). **Walton Co.:** springy woodland, bay head between Mossy Head and Deerland, 1956, R.K. Godfrey 55250 (GA, GH); swamp near De Funiak Springs, 6 Jul 1897, A.H. Curtiss 5926 (FLAS, FSU, GA, GH, NCU, US). **Washington Co.:** acid seep forest ravine above sandy limesink depression pond, 12 Sep 1989, S. Orzell and E. Bridges 11883 (NCU). **GEORGIA: Decatur Co.:** wet woods near Whigham, 10 Aug 1901, R.M. Harper 1185 (US). **Liberty Co.:** Fort Stewart, bayhead E of FS 9, locally common in full shade, stems lax, 9 Jul 1992, R. Carter 10114 with P. Bower (VDB). **Thomas Co.:** low wet woods along small stream, near Thomasville, 14 Aug 1936, D.S. Correll 6484A (DUKE). **Worth Co.:** densely shaded sphagnum pocket in swamp, Sylvester, H.K. Svenson 6928 (GH). **LOUISIANA: Orleans Parish:** New Orleans, Ingalls s.n. (NY) [cited by Gale 1944]. **MISSISSIPPI: Simpson Co.:** Saratoga, 3 Aug 1903, S.M. Tracy 8616 (GH, US). **Stone Co.:** University of Mississippi Forest Lands, S of Wire Road and E of route 15, mossy headwaters of Little Railroad Creek, 21 Aug 1997, B.A. Sorrie 9445 (GH, NCU). **NORTH CAROLINA: Hoke Co.:** Fort Bragg, McPherson Impact Area buffer zone, sphagnous mucky soil of streamhead pocosin, 25 Oct 1991, B.A. Sorrie 6060 (bas, GH); Fort Bragg, in troop trail through branch of Nicholson Creek, growing prostrate through sphagnum, 28 Sep 1992, B.A. Sorrie 7002 (bas, NCU). **Moore Co.:** Sandhills Game Land, E of SR 1104, in sphagnum of old roadbed through tributary of Deep Creek, 4 Sep 1997, B.A. Sorrie 9482 (NCU, SWSL). **Richmond Co.:** Sandhills Game Land, W of SR 1003, tributary of Naked Creek, large tussocks where fire burned into pocosin, 9 Sep 1997, B.A. Sorrie 9490 (bas, FSU, GA, GH, NCU, VDB). **Scotland Co.:** Camp MacKall (U.S. Army), boggy depression bordering floodplain of Drowning Creek, 5 Aug 1992, J.O. Larke s.n. (VDB); Sandhills Game Land, headwaters of Little Muddy Creek, frequent in streamhead pocosins with abundant cane, burned January 1994, 17 Aug 1994, B.A. Sorrie 8131 (bas, GA, GH, NCU, VDB). **SOUTH CAROLINA: Aiken Co.:** Aiken, 1866, H.W. Ravenel s.n. (GH). **Barnwell Co.:** pond side, Savannah River Nuclear Operations Area, W.T. Batson and W.R. Kelly s.n. (NCU). **Chesterfield Co.:** swift stream in Carolina Sandhills Refuge, 4.2 mi, S of jct. of SC 109 on SC 145, 26 Jul 1994, R. Kral 83865 (VDB). **Darlington Co.:** Hartsville, flats across from paper mill, 5 Jul 1909, W.C. Coker s.n. (NCU).

Rarity

Despite the relative paucity of historical specimens, I believe that *Rhynchospora leptocarpa* is not rare but merely overlooked. In addition to the above collections, I have encountered it at 40 sites from North Carolina to Mississippi. *Rhynchospora leptocarpa* is not difficult to find in proper habitat. It inhabits a narrow niche, but one which is widely distributed over much of the coastal plain. However, these streamheads are usually very shrubby and tangled with *Smilax laurifolia*, thus uninviting to botanists. The period when it is most easily detected—July to mid September—is one of formidable heat and humidity. Add insects, venomous snakes, poisonous plants (*Toxicodendron vernix* (L.) Kuntze), and resemblance to several other *Rhynchospora* (especially *R. chalarocephala*), and there is small wonder that *R. leptocarpa* remained little known. For many of the same reasons, *Lindera subcoriacea* remained unknown until recently (Wofford 1983), but subsequently has been documented from over fifty sites in eight states. The two species co-occur at several sites in the Carolina Sandhills. Even with continued fire suppression and conversion of longleaf ecosystems, searches in appropriate habitat are likely to yield many more populations of *Rhynchospora leptocarpa*.

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